植物研究雑誌
J. Jpn. Bot.
75: 296–302 (2000)

A Taxonomic Note on *Sinocrassula paoshingensis* (S.H.Fu) H.Ohba et al. and *Sedum indicum* (Decne.) Berger var. *luteorubrum* Praeger (Crassulaceae)

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(Received on June 7, 2000)

A new combination, *Sinocrassula paoshingensis*, is proposed. *Sinocrassula paoshingensis* is distinguishable from *S. indica* (Decne.) Berger by its oblong flowers, straight petals with recurved apex and dorsally unswollen ovaries. *Sedum indicum* var. *luteorubrum* Praeger is regarded as a synonym of *Sinocrassula paoshingensis*.

Key words: Crassulaceae, flora of China, new combination, *Sedum paoshingensis*, taxonomy

Sinocrassula paoshingensis (S.H.Fu) H. Ohba, S.Akiyama & S.K.Wu, comb. nov. [Figs. 1, 2, 3a, 3b, 4]

Sedum indicum (Decne.) Raym.-Hamet var. *luteorubrum* Praeger in Notes Bot. Gard. Edinburgh **13**: 84 (1921).

Sinocrassula indica (Decne.) Berger var. *luteorubra* (Praeger) S.H.Fu in Fl. Reipubl. Popularis Sin. **34**(1): 68 (1984).

Sedum paoshinense S.H.Fu in Acta Phytotax. Sin. Add. **1**: 114 (1965); in Fl. Reipubl. Pop. Sin. **34**(1): 74 (1984). K.T.Fu in Wang, Vasc. Pl. Hengduan Mts. **1**: 665 (1993).

Sinocrassula indica auct. non (Decne.) Berger: H. Ohba in J. Jap. Bot. **67**: 196 (1992).

Sinocrassula luteorubrum (Praeger) H. Chuang in Fl. Yunnan. **8**: 142 (1997), nom. invalid.

Perennial glabrous herbs with rosettes. Rosulate leaves succulent, widely elliptic to elliptic, to 1 cm long, to 5 mm wide, apex spinulose, base cuneate to round. Flowering stems from center of a rosette, straight or straight from a procumbent base, 6–20 cm tall, terete, smooth, pale green. Cauline leaves alternate, succulent, elliptic to linear, to 1.3 cm long, to 3 mm wide, apex spinulose, base cuneate to round; fallen leaves rooting at base. Inflorescences terminal, nearly flat topped cymes, 10–40-flowered, bracteate or ebracteate; bracts 1–6 mm long, linear. Flowers in August, oblong, pedicellate; pedicels 0.7–3(–5) mm long. Calyx tube ca. 1 mm long; lobes 5, spurless, narrowly triangular to subulate, 3–4.2 mm long, base 1–1.7 mm wide, apex tapering, with obtuse tip, erect through flowering. Petals 5, linear to narrowly oblong or linear lanceolate, 4–5.4 mm long, 1–1.5 mm wide, apex apiculate, erect throughout flowering, with reflexed apex. Stamens 5, alternate petals, slightly shorter than petals; filaments erect, 3–4 mm long; anthers basifixed, oblong, cream colored before dehiscence. Nectaries 5, opposite petals, widely oblong to square, ca. 0.7 mm long, 0.5–0.7 mm wide. Ovaries 3.5–4.2 mm long, base slightly connate on ventral side, not swollen on dorsal side, tapering; styles indistinguishable; stigma papillate; ovules ca. 50 in each locule. Follicles not observed.

Specimens examined. **China**. **Sichuan**. Daocheng Xian: Gongling–Riwa–Gonnga Zhongu (Wu et al. 848, 2 Aug. 1997, KUN, TI). Garlung Xian: Puchang, 700 m (Unknown collector 14335, PE). **Yunnan**. Deqin Xian: Meili Xueshan, Suola to Melishi, 2950 m (Wu et al. 103555, 24 Aug. 1999, KUN, TI).

Sinocrassula indica (Decne.) Berger in Engl. & Prantl., Nat. Pflanzenfam. 2 Auf. **18**a: 463 (1930). S.H.Fu in Fl. Reipubl. Pop. Sin. **34**(1): 66 (1984); in Wang, Vasc. Pl. Hengduan Mts. **1**: 657 (1993).

Specimens examined. **China**. **Yunnan**. Dali Shi: Fongho stream on the eastern slope of Dianchang Shan, 2000–2400 m (Kato & Akiyama 1921, 9 Aug. 1988). Deqin Xian: Meili Xueshan, Suola to Melishi, 2750 m (Wu et al. 103557, 24 Aug. 1999, KUN, TI). Lijiang Xian: Hutiaojian, 1900 m (Ohba et al. 664, 9 Sept. 1987, KUN, TI); Lijiang–Ganhaizi, 2750–2800 m (Ohba et al. 829, 15 Sept. 1987, KUN, TI); Shudi, 1550–1750 m (Iwatsuki et al. 1897, 7 Oct. 1987, KUN, TI); Tuagshan, 2350–2600 m (Ohba et al. 1883, 6 Oct. 1987, KUN, TI); Yuhu, 2600–2650 m (Ohba et al. 823, 14 Sept. 1987, KUN, TI).

Sinocrassula paoshingensis, described (as *Sedum paoshingense*) on the basis of a single collection by S. H. Fu from Paoshing (= Baoxing), Sichuan Province, China in 1933 (Fu, 1965), is the type species of section Sinosedum (Fu, 1965). Ohba (1992) studied a second collection, which was found at Puchang at an elevation of 700 m, Garlung Xian, Sichuan, by an unknown collector (no. 14335 in PE) and, based on morphological characters, treated the species as falling within the range of variation of *Sinocrassula indica* (Decne.) Berger.

In 1997 Akiyama and Wu found plants resembling *Sinocrassula paoshingensis* in

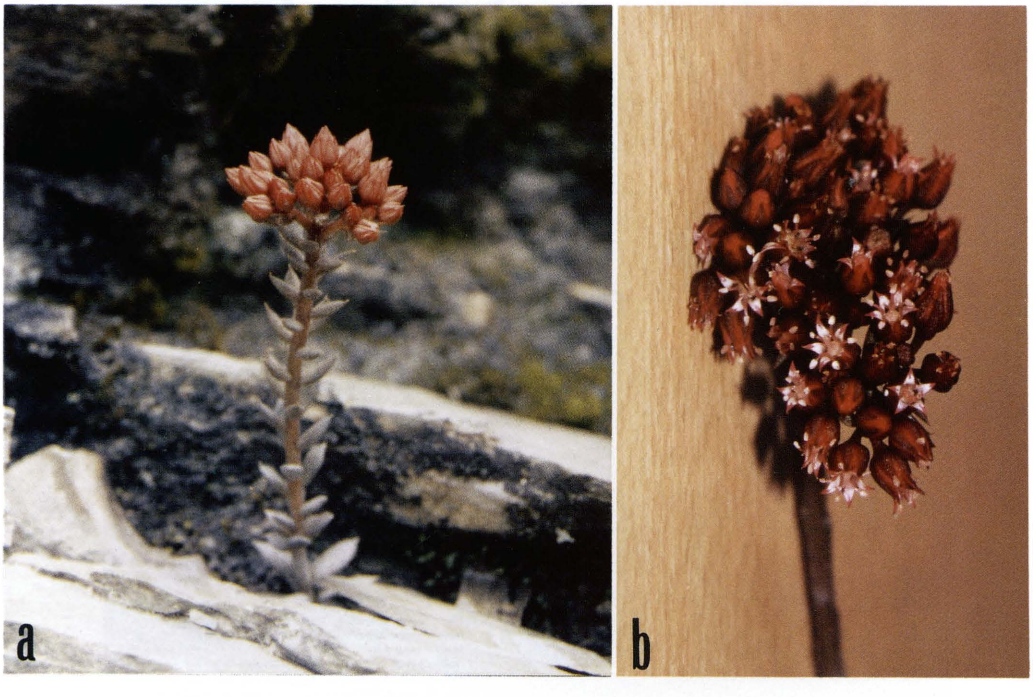

Fig. 1. *Sinocrassula paoshingensis* H.Ohba, S.Akiyama & S.K.Wu. a: Sichuan Prov. in August 1997. b: Yunnan Prov. in August 1999.

Sichuan and in 1999 in Yunnan (Fig. 1). Those plants have vegetative and floral features that exactly correspond to those of *Sinocrassula paoshingensis*. The plants lacks rosulate leaves at the base of flowering stem at flowering time, but they have a few small rosettes in the leaf axils located near the ground (Fig. 2). These axillary rosettes

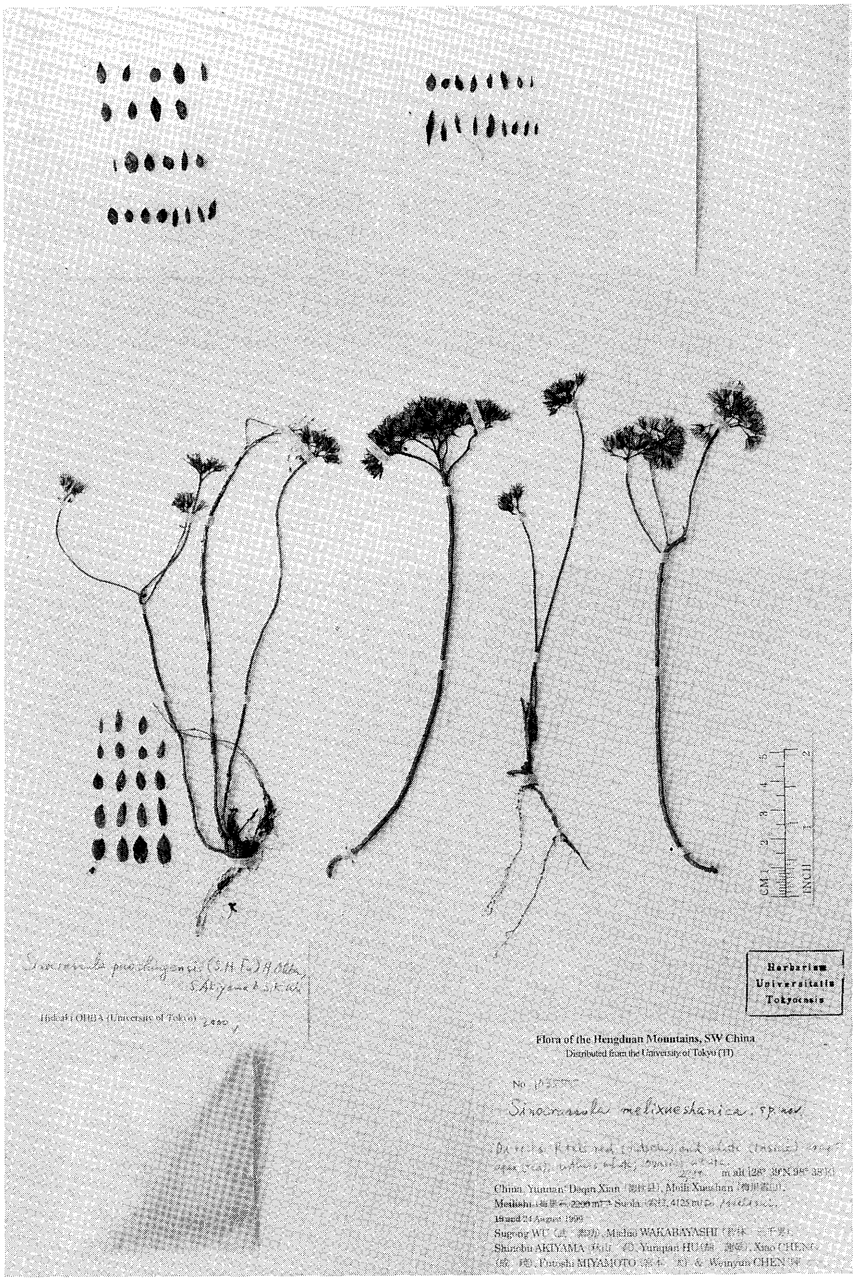
CM 1 2 3 4 5
INCH 1 2
Herbarium Universitatis Tokyoensis
Flora of the Hengduan Mountains, SW China
Distributed from the University of Tokyo (TI)
Sinocrassula melixueshanica, sp. nov.

Fig. 2. *Sinocrassula paoshingensis* H.Ohba, S.Akiyama & S.K.Wu (Wu et al. 103555, TI).

undoubtedly remain after the flowering stem disappears. This seems to be a common feature in *Sinocrassula paoshingensis* because the specimen deposited in PE (no. 14335) also has no rosulate leaves at the base of the flowering stems. Moreover, the cauline leaves are easily detached when touched, so the pressed plants have almost no leaves (Fig. 2). In contrast, *Sinocrassula indica* has a prominent rosette of leaves at the base of the flowering stem, even in fruit, and bears cauline leaves when dried (Fig. 3c).

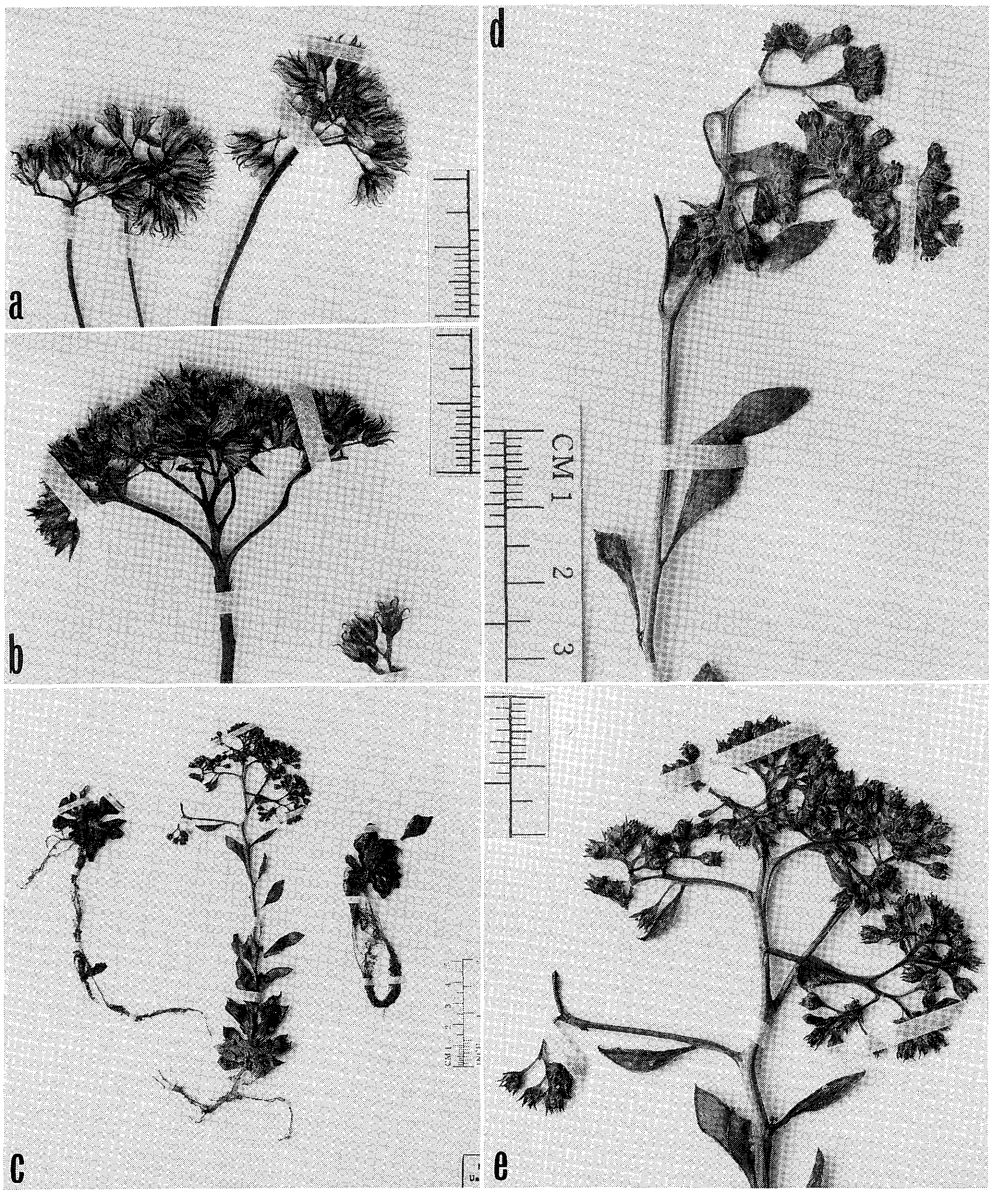

Fig. 3. Inflorescences of *Sinocrassula paoshingensis* (a, b: Wu et al. 103555) and *S. indica* (c–e: Wu et al. 103557).

Although Ohba (1992) wrote that the floral and vegetative features were not useful to distinguish between *Sinocrassula indica* and *S. paoshingensis*, *S. paoshingensis* is apparently different from *S. indica*. It became apparent through our field observations in the

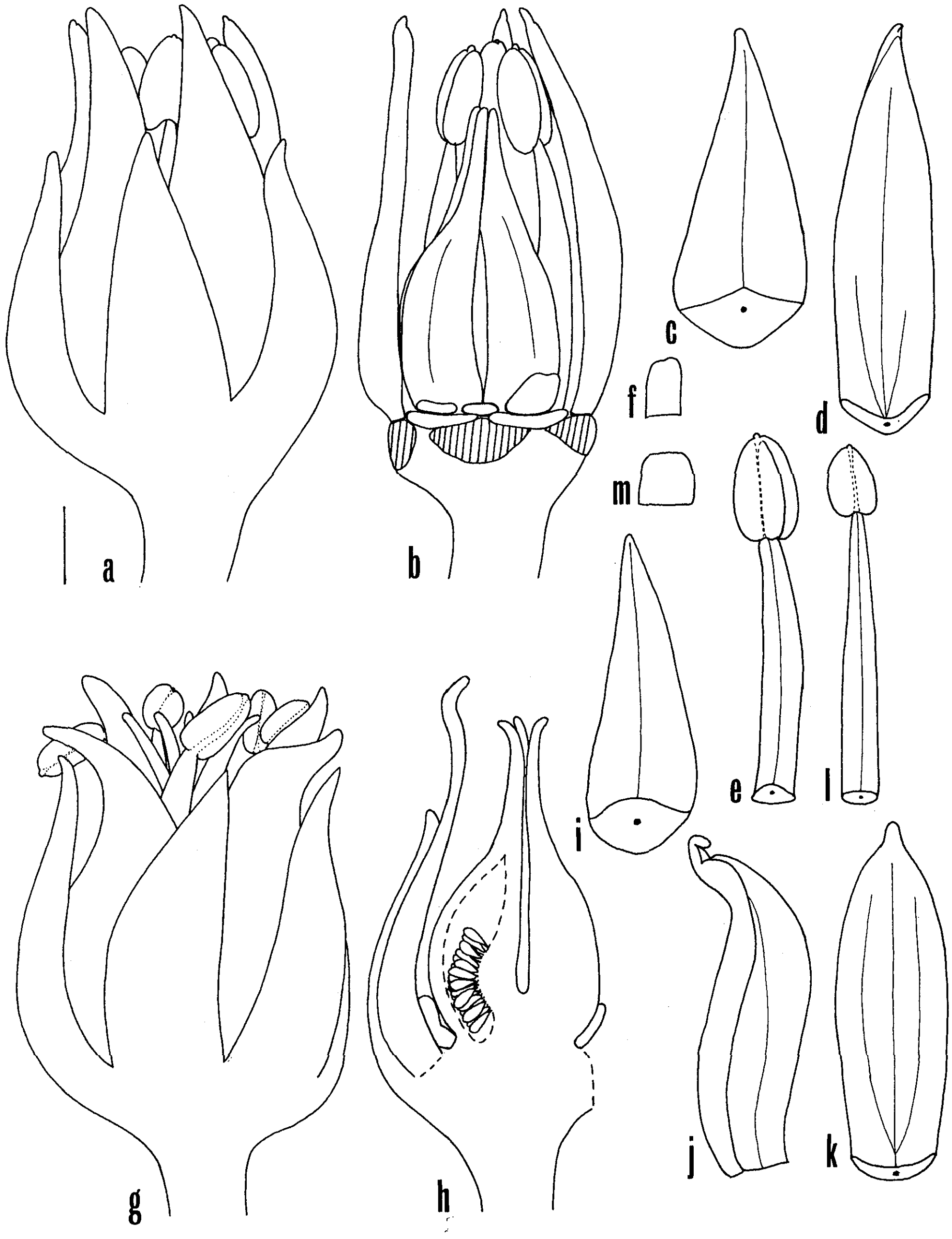

Fig. 4. *Sinocrassula paoshingensis* H.Ohba, S.Akiyama & S.K.Wu (a–f: Wu et al. 848. g–m: Wu et al. 103555). a, g: Flowers. b, h: Ovaries. c, i: Sepals. d, j, k: Petals (j: lateral view). e, l: Stamens. f, m: Nectaries. Bar indicates 1 mm.

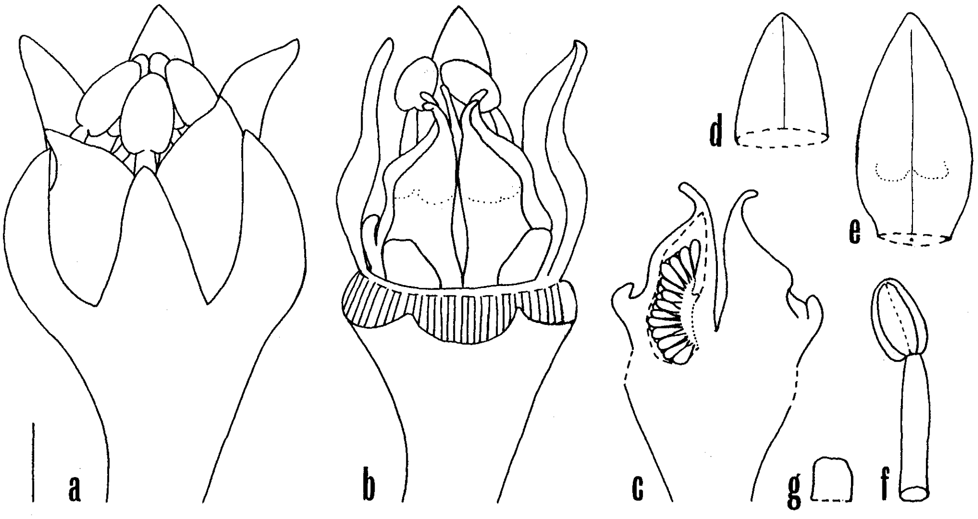

Fig. 5. *Sinocrassula indica* (Decne.) Berger (Wu et al. 103557). a: Flower. b, c: Ovaries. d: Sepal. e: Petal. f: Stamen. g: Nectary. Bar indicates 1 mm.

Sino-Himalayan region that the external appearance and floral features illustrated in Ohba's paper (1992) are beyond the variation ranges of *Sinocrassula indica*. In *S. paoshingensis* the flowers are disposed in a compact almost flat topped cymose inflorescence and have pedicels 0.7–3(–5) mm long and bracts 1–6 mm long, or are often ebractate (Figs. 3a, b). The inflorescences of *Sinocrassula indica* are more or less paniculate with leafy bracts (to 1.5 cm long) and pedicels 3–5 mm long (Figs. 3d, e). *Sinocrassula paoshingensis* has straight, erect petals reflexed at the apex and unswollen narrow ovaries which make the outline of the flower oblong (Figs. 1, 4a, g). *Sinocrassula indica* differs in having globose-urceolate flowers (Fig. 5a). The petals of *Sinocrassula paoshingensis* are linear-subulate to narrowly oblong (Figs. 4d, j, k) but not lanceolate to ovate as in *Sinocrassula indica* (Fig. 5e). The petals of *Sinocrassula paoshingensis* is whitish inside with a rose carmine apex and rose carmine outside (pale greenish cream when dried) (Fig. 1) while those of *S. indica* are essentially dull red with some variation. A plant collected in Deqin Xian, Yunnan, in 1999 (same locality of *Sinocrassula paoshingensis*) has petals that are green outside and dull reddish inside. The ovaries of *Sinocrassula paoshingensis* are slender (Figs. 4b, h) but dorsally rounded in *Sinocrassula indica* (Figs. 5b, c). The haplostemonous flowers place *Sinocrassula paoshingensis* in the genus *Sinocrassula*, as pointed out by Ohba (1992). Within *Sinocrassula S. paoshingensis* is distinguishable from all other species. *Sinocrassula paoshingensis* resembles *Sinocrassula ambigua* (Praeger) Berger, but differs by having sepals shorter than the petals, acuminate leaves 3.5–5 mm long, and oblanceolate to linear basal leaves.

Sinocrassula indica (Decne.) Berger var. *luteorubra* (Praeger) S.H.Fu, which was collected on the Mekong–Salwin divide (in Lat. 28° 10' N) by G. Forrest (no. 13377) in 1914, is considered to be identical with *Sinocrassula paoshingensis*. Praeger (1921) characterized the varietv by itse umbellate inflorescence and the oblong, straight, erect petals. Compared with type and the second collection illustrated by Ohba (1992) of *Sinocrassula paoshingensis*, *Sinocrassula indica* var. *luteorubra* has more branched compact inflorescences, but the density of the flowers and braching seems to be variable. Akiyama and Wu collected *Sinocrassula paoshingensis* in Yunnan very near the type locality of the variety.

Zhuang (Chuang) (1997) used the name *Sinocrassula luteorubra* (Prager) H. Chuang without direct reference to the basionym. This combination is unfortunately invalid under Article 33.1 of the International Code of Botanical Nomenclature (Tokyo Code 1994).

We are indebted to Dr. David E. Boufford, the Harvard University Herbaria, for reading the manuscript. We thank the curator of the Herbarium, Laboratory of Systematic and Evolutionary Botany, Institute of Botany, Academia Sinica, Beijing for allowing us to study their specimens. We thank also the members of the botanical research teams of the University of Tokyo and the Kunming Institute of Botany in 1997 and 1999 for their help in the field. This study was supported by Grants-in-Aid for Monbusho International Scientific Research Program: Field Research from the Ministry of Education, Science, Sports, and Culture, Japan in 1997 (to H. O.), and for Scientific Research (A) from Japan Society for the Promotion of Science, no. 11691178 in 1999 and 2000 (to H. O.).

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大場秀章[a]，秋山　忍[b]，武　素功[c]：*Sinocrassula paoshingensis* (S.H.Fu) H.Ohba et al. と *Sedum indicum* (Decne.) Berger var. *luteorubrum* Praeger についての分類学的考察

中国四川省から報告された *Sedum paoshingense* S.H.Fu についての最初の研究で，Ohba（1992）は *Sinocrassula indica*（Decne.）Berger の異名とした．1997年に四川省稲城県，1999年に雲南省徳欽県でこの植物を見出し，その生育状況及び形態について観察を行った．これらと採集した標本にもとづいて考察した結果，*Sedum paoshingense* S.H.Fu は，*Sinocrassula indica*（Decne.）Berger の変異には含まれない固有の特徴をもち，後者とは別種であることが明らかとなった．中でも，萼筒部が短く，かつ花弁が長いため花が長楕円体状となること，花弁は先端のみが外曲し，子房は背側が膨らまないこと，根生葉は花時には見られず，茎葉は接触すると脱落しやすい点は，この種を *Sinocrassula indica* から区別する上でのよい特徴となる．この種について先に雲南大学の庄璇は，雲南植物誌 8 巻（1997）で，Praeger が1921年に発表した *Sedum indicum* var. *luteorubrum* を独立種と考察し *Sinocrassula luteorubra* という学名を提唱したが，basionym の出典が明示されておらず，これは有効発表とは認められない．また，庄璇は，この種が *Sedum paoshingense* と同種であることには気付かなかった．この種について種のランクで最も早く有効に発表された種名である *Sedum paoshingense* にもとづいて，*Sinocrassula paoshingensis* を提唱した．

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